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FILTER FOR SWIMMING POOLS

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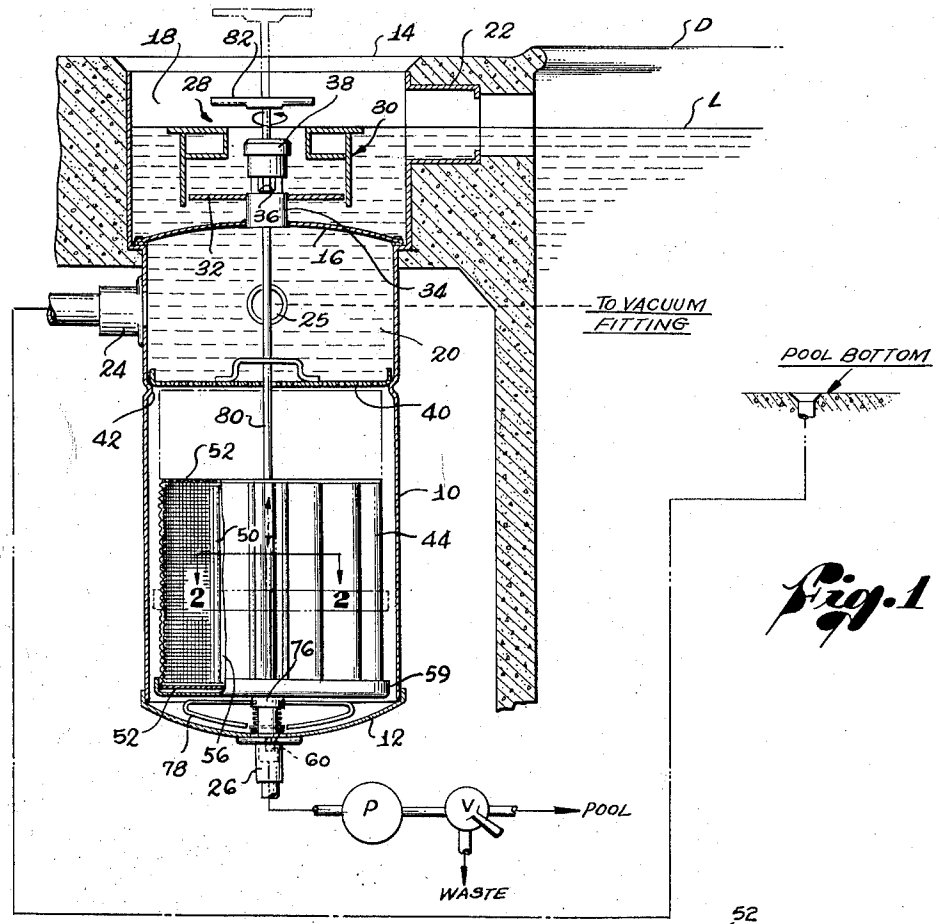


Fig. 1

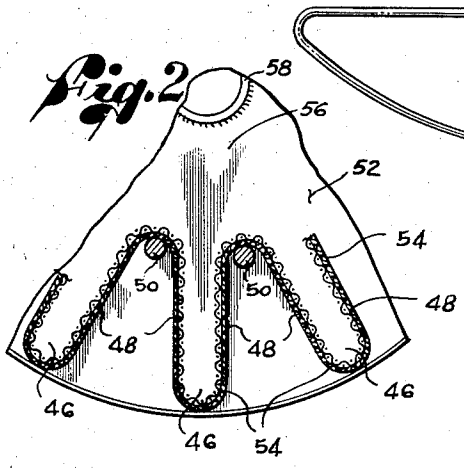


Fig. 2

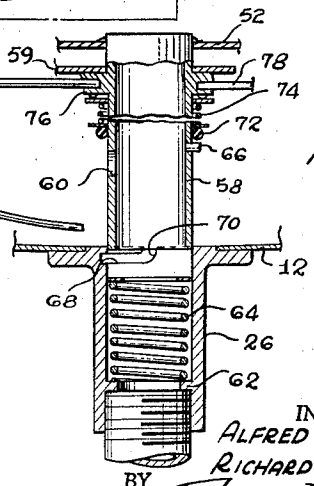


Fig. 3

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FILTER FOR SWIMMING POOLS

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4 Claims. (Cl. 210—407)

This invention relates to filters for pressure fluid systems, and more particularly to an improved filter which is uniquely designed to facilitate cleaning of the filter element.

Briefly stated, the invention provides a filter equipped with a casing having an inlet through which liquid to be filtered enters the casing, an outlet through which filtered liquid is discharged from the casing, and a filter element through which the liquid flows between the inlet and outlet for effecting removal of solid contaminants from the liquid. During operation of the filter, the solid materials which are filtered out of the liquid tend to accumulate on the surfaces of the filter element. This accumulation restricts flow of liquid through the element, and, therefore, reduces the rate at which liquid may be passed through the filter.

Accordingly, it is necessary to periodically remove the accumulations of solid materials from the filter element. In the past, this cleaning operation necessitated removal of the filter element from the casing of the filter which was a troublesome, time-consuming and unpleasant procedure.

A broad object of the present invention is the provision of a filter of the character described which avoids the above-noted and other deficiencies of existing filters.

A more specific object of the invention is the provision of a filter of the character described which is uniquely designed to facilitate periodic cleaning of the filter element.

Another object of the invention is the provision of a filter of the character described wherein periodic cleaning of the filter element may be accomplished without removal of the element from the filter casing.

Yet another object of the invention is the provision of a filter of the character described, wherein accumulations of solid matter on the interior wall of the casing about the outlet may be removed simultaneously with cleaning of the filter element and without disassembly of the filter.

A further object of the invention is the provision of the filter of the character described which is relatively simple in construction, reliable in operation, and easy to use.

Other objects, advantages and features of the invention will become apparent as the description proceeds.

Briefly, the foregoing objects are achieved by the provision of a filter wherein the filter element has an outlet extension which is removably coupled to the outlet of the filter casing, so that normally, liquid flow occurs through the permeable walls of the filter element to the interior of the latter and thence through the outlet extension of the filter to the outlet of the casing. A handle located exteriorly of the filter casing and connected to the filter element is provided for disconnecting the element from the filter casing and reciprocating the element to loosen accumulated solid matter thereon.

Uncoupling of the outlet extension of the filter element from the outlet of the filter casing permits liquid entering

the casing to bypass the filter element and flow directly to the outlet of the filter casing. This flow of liquid occurs over the exterior of the filter element and carries away the loosened solid matter. Scraping elements may also be provided on the filter element for removing deposits of solid matter which are prone to accumulate on the interior wall of the filter casing.

It will become readily apparent as the description proceeds that the improved filter of this invention has general utility and is capable of use in a wide variety of fluid pressure systems. For sake of illustration, the invention will be described with reference to one typical use of the filter, namely, in the filter system of a swimming pool.

The invention may be best understood from the following detailed description thereof, taken in connection with the annexed drawings, wherein:

Fig. 1 is a longitudinal section through a swimming pool filter embodying the invention, and illustrates the filter element of the filter in its normal operative position;

Fig. 2 is an enlarged section taken along line 2—2 of Fig. 1; and

Fig. 3 is a partial view of the filter of Fig. 1 illustrating the filter element as being uncoupled from the filter casing for cleaning purposes.

Referring now to these drawings, the illustrative swimming pool filter will be seen to comprise a normally vertical, generally cylindrical casing **10**, the normally lower end of which is closed by an integral end wall **12**. The upper end of the casing **10** is fitted with a removable cover **14**. Extending across the interior of the casing **10**, intermediate the ends of the latter, is a fixed partition **16** which separates the casing interior into an upper chamber **18** and a lower chamber **20**. The portion of the casing enclosing chamber **20** forms a vertical filter tank having lower and upper end walls **12** and **16**, respectively.

Located on the cylindrical wall of the casing **10** adjacent the upper end of the latter, is a first, rectangular inlet **22** which opens into the upper casing chamber **18**. Indicated at **24** is a second inlet which opens through the cylindrical wall of the casing **10**, into the lower casing chamber **20**, below the partition **16**. A third tank inlet **25**, opening to the chamber **20**, is provided for connection to a vacuum fitting (not shown) in the pool side wall.

Rigidly fixed to the lower wall **12** of the casing is a flanged outlet or discharge fitting **26**, soon to be more fully described, which provides a water outlet from the casing.

In a typical installation of the illustrated swimming pool filter, the casing **10** is recessed below the deck of the swimming pool, indicated at D in Fig. 1, and the inlet **22** opens through the side wall of the pool, as shown. The casing is so vertically located that the normal level L of the water in the pool is located approximately at the midpoint of the inlet opening **22**, as shown. In this typical installation, the second inlet **24** connects to a drain in the bottom of the pool and the outlet **26** of the casing connects to the suction of a pump P. This pump discharges to a valve V which is selectively positionable to return the water to the swimming pool or deliver the water to waste, as indicated.

Briefly, in normal operation of the filter to be hereinafter more fully described, water enters the filter casing **10** through both of the inlets **22** and **24**, filtered water being withdrawn from the casing through the outlet **26** by the pump P and returned to the pool through the valve V. During cleaning of the filter, water again enters the filter casing through both of the inlets **22** and **24**

but, in this case, the valve V is positioned to discharge water from the filter to waste.

Located in the upper casing chamber **20** is a skimmer **28** of the character disclosed in Patent No. 2,579,304. As described more fully in this patent, the skimmer **28** comprises a buoyant cylinder **30** open at opposite ends and slideably fitted over a disk **32**. Disk **32** is fixed to the upper end of a sleeve **34** which is rigidly fixed at its lower end to the partition **16**. The interior of the sleeve opens into the lower casing chamber **20**.

The upper end of the sleeve **34** is externally threaded and provided with a pair of diametrically opposed ports **36** through which water may flow from the upper casing chamber **18** to the interior of the sleeve **34** and thence through the latter to the lower casing chamber **20**. Threaded on the upper end of the sleeve **34** is a cap **38**.

The structure comprising the ports **36** and cap **38** forms a valve for regulating flow to the filter tank from the skimmer for the reasons discussed in copending application, Serial No. 733,110, filed May 5, 1958, and entitled Swimming Pool Filter. Suffice it to say here that the cap **38** is adjustable on the sleeve **34** either to adjust the effective area of the ports **36**, so as to regulate the rate of flow of water from the upper casing chamber **18** to the lower casing chamber **20**, or to completely close the ports **36**, so as to seal off the lower casing chamber **20** from the upper casing chamber **18**. Insofar as the present invention is concerned, however, the cap **38** may be assumed to be positioned so as to permit free flow of water from the upper casing chamber to the lower casing chamber.

Loosely received within the lower casing chamber **20** is a circular perforate basket or screen **40**. This screen is supported around its periphery on an internal, upwardly facing annular shoulder **42** within the filter casing **10**, so as to permit upward movement of the screen in the casing. Located between the screen **40** and the lower wall **12** of the filter casing is a filter element **44**.

Filter element **44** comprises, as shown most clearly in Fig. 2, a series of hollow, radially extending filter sections **46**. Each of these filter sections comprises an inner wall **48** of wire mesh which is formed into a flat loop, as shown, and secured at the radial inner edge of the section to a rod **50**. The several rods **50** of the several filter sections **46** are secured at opposite ends to a pair of end plates **52** at opposite ends of the filter element. The outer walls **54** of the filter sections comprise a suitable permeable fabric material through which water may flow from the exterior of the filter element to the interior of the several radially extending filter sections **46**, and thence to the central passage **56** of the filter element.

Rigid on the lower disk **52** of the filter element and extending axially of the latter is an outlet sleeve **58**, the interior of which opens into the central passage **56** of the filter element. Sleeve **58** extends tightly through an end cap **59** fixed to the lower end of the filter element. This sleeve is open at its lower end and has an opening **60** formed in its cylindrical wall.

The lower end of the sleeve **58** is slidably and rotatably receivable in the central discharge passage in fitting **26**. Located between the lower end of the sleeve **58** and an internal shoulder **62** in the discharge fitting **26** is a compression spring **64**. The spring is compressed when the sleeve **58** is inserted into the discharge fitting so as to urge the filter element **44** in an upward direction.

Rigidly fixed in the cylindrical wall of the sleeve **58** and projecting from the outer surface of the latter is a locking pin **66**. This locking pin, in normal operation of the filter, is received in an internal, annular groove **68** in the upper end of the discharge fitting **26**. Pin **66** may be released from the groove **68** by rotating the sleeve **58** to align the locking pin **66** with an axial groove **70**, opening into the groove **68**.

Locking pin **66** and grooves **68** and **70** form a bayonet-type lock for locking the sleeve **58** in its normal lower position, illustrated in Fig. 1, and against the upward force exerted on the sleeve by the spring **64**. In this lower position of the sleeve **58**, the upper edge of the opening **60** in the sleeve **58** will be observed to be below the upper face of the discharge fitting **26**, so as to preclude the flow of water from the lower casing chamber **20** through the opening **60**. In order to effectively prevent any leakage of water between the discharge fitting **26** and sleeve **58** through the opening **60**, the sleeve **58** is encircled by an O-ring **72** which is pressed into sealing contact with the upper face of the discharge fitting **26** by a spring **74**, when the sleeve **58** is locked in the fitting. Other types of sealing means or springs for this purpose may, of course, be used.

Formed about the upper end of the sleeve **58**, just below the filter element **44**, is an annular shoulder **76** to which are rigidly fixed a plurality of radially extending, wire sludge scrapers **78**. Fixed to the filter element **40** and extending axially upwardly through the casing **10**, basket **40**, inlet sleeve **34** and cap **38** is a rod **80**. This rod is freely rotatable and axially movable relative to end wall **16** and screen **40**, and mounts an upper handle **82** by means of which the filter element **44** may be rotated and reciprocated, as indicated in Fig. 1.

In normal operation of the filter, the sleeve **58** of the filter element **44** will be locked in its lower position (Fig. 1) in the discharge fittting **26**, so that water entering the lower casing chamber **20** through the inlets **22** and **24** is forced to flow through the fabric walls **54** of the several filter sections **46** to the interiors of the filter sections and thence through the central passage **56** of the filter element and sleeve **58** to the filter outlet **26**. Solid matter in the water is thereby effectively filter from the water, the filtered water being returned to the pool by the pump P, as previously mentioned. During prolonged operation of the filter, deposits of this solid matter tend to accumulate on the outer surfaces of the filter element **44**, as well as on the upper surface of the bottom wall **12** of the filter casing **10**. Deposits on the outer surfaces of the filter element **44**, of course, impede the flow of water through the filter.

In order to assure proper functioning of the filter, it is necessary to periodically clean the filter element by removing these deposits. Since the deposits on the bottom wall of the filter casing also tend to build up over a period of time, it is necessary to periodically remove these latter deposits.

Cleaning of the filter element **44** and the bottom wall of the filter casing is accomplished as follows. Cover **14** of the filter casing is removed and the filter element is uncoupled from the discharge fitting **26** by turning the filter actuating handle **82**. This releases the sleeve **58** for upward movement under the action of a compressed spring **64**, to the raised position of Fig. 3, wherein the sleeve opening **60** provides a bypass opening which affords direct communication between the discharge passage in fitting **26** and the lower casing chamber **20**. In this raised position of the filter element, accordingly, water entering the filter casing through the inlets **22** and **24** may bypass the filter element **44** and flow directly to the filter discharge through the opening **60**.

While the water is thus flowing over the exterior of the filter element **44**, the latter is rapidly reciprocated and oscillated by means of handle **82**. This reciprocation and oscillation of the filter element in the water within the lower casing chamber **20** tends to loosen the deposits of solid matter. After being separated from the filter element, these deposits are carried with the water flowing over the exterior of the element through the opening **60** and the filter discharge **26** to the pump P whereupon they are discharged to waste.

The filter element is then oscillated by means of handle **82** to effect scraping of the deposits of solid matter

from the bottom wall 12 of the casing by the wire scrapers 78. These loosened deposits are also carried to waste.

After the filter element and the bottom wall of the casing have been thus cleaned, the sleeve 58 of the filter element is again locked in its lower position in the discharge fitting 26 to close the bypass opening 60 in the sleeve and thereby effect resumption of the normal filtering operation of the filter.

While a preferred embodiment of the invention has been disclosed for illustrative purposes, it will be apparent that numerous modifications in design, arrangement of parts and instrumentalities are possible within the scope of the following claims.

We claim:

1. In a filter, comprising a normally vertical filter tank including upper and lower end walls, an inlet, and an outlet fitting mounted on said lower end wall, said fitting having a vertical discharge passage opening through said lower end wall, a permeable filter element within said tank including a lower outlet sleeve which is normally slidably inserted in said passage and through which liquid may flow from the interior of said element to said passage, means for sealing said sleeve to said fitting against leakage of liquid from the interior of said tank to said passage when said sleeve is inserted to its normal position in said passage, said sleeve being retractable out of said passage by elevating said filter element to a raised position in the tank, there being a bypass opening affording direct communication between the interior of the tank and said passage in said raised position of the filter element, the improvements comprising a vertical rod fixed at its lower end to said filter element, the upper end of said rod being freely axially movable and rotatable in and extending above said upper end wall, a handle on said upper end of said rod for rotating and vertically moving said filter element in said tank, and rotatably releasable lock means for locking said sleeve in its normal position and releasable by turning of said handle to permit elevating of said element to its raised position and rapid reciprocation and oscillation of the element while in its raised position to wash off the exterior of the element.

2. The subject matter of claim 1 including yieldable means for urging the element toward its raised position.

3. In a filter, comprising a normally vertical filter tank including upper and lower end walls, an inlet, and an outlet fitting mounted on said lower end wall, said fitting having a vertical discharge passage opening through said lower end wall, a permeable filter element within said tank including a lower outlet sleeve which is normally slidably inserted in said passage and through which liquid may flow from the interior of said element to said passage, means for sealing said sleeve to said fitting against leakage of liquid from the interior of said tank to said passage when said sleeve is inserted to its normal position in said passage, said sleeve being retractable out of said passage by elevating said filter element to a raised position in the tank, there being a bypass opening affording direct communication between the interior of the tank and said passage in said raised position of the filter element, the improvements comprising a vertical rod fixed at its lower end to said filter element, the upper end of said rod being freely axially movable and rotatable in and extending above said upper end wall, a handle on the upper end of said rod for rotating and vertically moving said filter element in said tank, and cooperating rotatably releasable lock means on said sleeve and fitting for locking said sleeve in its normal position and releasable by turning of said handle to permit elevating of said element to its raised position and rapid reciprocation and oscillation of the element while in its raised position to wash off the exterior of the element.

4. In a filter, comprising a normally vertical filter tank including upper and lower end walls, an inlet, and an outlet fitting mounted on said lower end wall, said fitting having a vertical discharge passage opening through said lower end wall, a permeable filter element within said tank including a lower outlet sleeve which is normally slidably inserted in said passage and through which liquid may flow from the interior of said element to said passage, means for sealing said sleeve to said fitting against leakage of liquid from the interior of said tank to said passage when said sleeve is inserted to its normal position in said passage, said sleeve being retractable out of said passage by elevating said filter element to a raised position in the tank, there being a bypass opening affording direct communication between the interior of the tank and said passage in said raised position of the filter element, the improvements comprising a vertical rod fixed at its lower end to said filter element, the upper end of said rod being freely axially movable and rotatable in and extending above said upper end wall, a handle on the upper end of said rod for rotating and vertically moving said filter element in said tank, and cooperating bayonet-type releasable lock means on said sleeve and fitting for locking said sleeve in its normal position and releasable by turning of said handle to permit elevating of said element to its raised position and rapid reciprocation and oscillation of the element while in its raised position to wash off the exterior of the element.

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